IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant:	Dolan, et al.	Group Art Unit:	2625
Serial No.:	09/823,372	Examiner:	Thompson, James A.
Filed:	March 30, 2001	Customer No.:	55648
Title:	ROBUST DOCUMENT BOUNDARY DETERMINATION		

APPELLANT'S BRIEF

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January 23, 2007

Mail Stop APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
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Dear Sir:

BACKGROUND

This brief is in furtherance of the Notice of Appeal, filed in this case on November 3, 2006.

The fees required under 37. C.F.R. § 41.20(b)(2), and any required petition for extension of time for filing this brief and fees therefore, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief comprises these subjects under the headings, and in the order, set forth below:

I. Real Party in Interest

II. Related Appeals and Interferences

III. Status of Claims

IV. Status of Amendments

V. Summary of Claimed Subject Matter

VI. Grounds for Rejection to be Reviewed on Appeal

VII. Argument

VIII. Conclusion

IX. Claims Appendix

X. Evidence Appendix

XI. Related Proceedings Appendix

The final page of this brief bears the practitioner's signature.

REAL PARTY IN INTEREST

The real party in interest in this appeal is Sharp Laboratories of America, Inc., assignee of the captioned application.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

A. TOTAL NUMBER OF CLAIMS IN THE APPLICATION

There are 27 claims currently pending in the application.

B. STATUS OF ALL CLAIMS

Claims canceled: 1, 16, 19, 29-33, and 35-39

Claims withdrawn: None

Claims pending: 2-15, 17, 18, 20-28, 34, and 40

Claims allowed: None

Claims objected to: None

Claims rejected: 2-15, 17, 18, 20-28, 34, and 40.

C. CLAIMS ON APPEAL

Claims 2-15, 17, 18, 20-28, 34, and 40 are on appeal.

A copy of the claims on appeal is set forth in the Claims Appendix to this Brief.

STATUS OF AMENDMENTS

No amendment was filed after final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter is generally directed to an imaging system for sensing an object. Specifically, as claimed in independent claim 40, from which the remaining pending claims each respectively depend, the imaging system may include an image sensor and a backing having a surface opposed to the sensor. *See* FIGS 2A-2C and Specification at p. 6 lines 7-17. The imaging system may also include an image processor having a plurality of stat buffers (FIGS 1

and 3; Specification at p. 7 lines 9-11 and p. 9 lines 16-23) and that analyzes candidate edges for bounding regions and identifies shadows cast by an object adjacent the backing as edges of a bounding region (Specification at p. 5 line 23 to p. 6 line 6; Id. at p. 7 lines 5-8) based, at least in part, on (i) a variable luminance threshold value automatically calculated using one or more statistical measures and that causes detection of shadows cast by the object on the backing (Specification p. 13 lines 17-24); and (ii) the presence of detected shadows in a contiguous plurality of stat buffers (*Id.* at p. 13 line 25 to p. 14 line 13.).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection presented for review are: (1) whether claims 2, 3, 12, 14, 15, 17, 18, 20, 21, 24, 25, 28, 34, and 40 are unpatentable under 35 U.S.C. §103(a) as being unpatentable over the combination of Ichihara, U.S. Patent No. 5,198,853 in view of Feng, U.S. Patent No. 6,046,828; (2) whether claims 4-8 are unpatentable under 35 U.S.C. §103(a) in view of the combination of Ichihara and Feng and in further view of Yamanishi, U.S. Patent No. 5,696,595; and (3) whether claims 9-11, 13, 22, 23, 26, and 27 are unpatentable under 35 U.S.C. §103(a) in view of the combination of Ichihara and Feng and in further view of Kowalski, U.S. Patent No. 5,778,104

ARGUMENT

REJECTION UNDER 35 U.S.C. §103(a) IN VIEW OF COMBINATION OF ICHIHARA AND FENG

The Examiner rejected claims 2, 3, 12, 14, 15, 12, 18, 20, 21, 24, 25, 28, 34, and 40 under 35 U.S.C. § 103(a) as being obvious in view of the combination of Ichihara et al., U.S. Patent No. 5,198,853 (hereinafter Ichihara) and Feng et al., U.S. Patent No. 6,046,828 (hereinafter Feng) . Independent claim 40, from which all other pending claims respectively depend, includes the limitation of "a variable luminance threshold value automatically calculated using one or more statistical measures and that causes detection of shadows cast by said object on said backing." This limitation is neither disclosed nor suggested by any of the cited references. Ichihara discloses a scanner that determines the size of a document by detecting edges of shadows cast on a cover by a document resting on a platen of the scanner. Ichihara's scanner illuminates the document and performs a scanning pass using a CCD sensor that outputs an image signal line, comprising pixel values. This signal is then subjected to a difference operator, which presumably filters the signal to show the change in pixel value relative to its immediate neighbor. Shadow edges are detected by comparing the difference value of each pixel to a pre-set threshold. Although the threshold of Ichihara is disclosed to be manually adjustable by means of a ten-key numeric keypad, the threshold is not "automatically adjustable" and is not "calculated using one or more statistical measures." Thus, Ichihara fails to disclose the limitation quoted above.

Feng discloses an edge detection mechanism for a document boundary that records luminance values sensed by each respective sensor pixel in a linear CCD array as a document is fed between the array and a backing material of a uniform luminance. More specifically, Feng

discloses that, because the backing has a uniform luminance, the standard deviation of luminance values recorded by a pixel in the array that images the backing reflects only pixel noise, *while the standard deviation of luminance values recorded by a pixel imaging a document also reflects, in addition to pixel noise, the luminance changes of the document itself.* Hence, the statistical measures used by Feng, *together* only detect the difference between the luminance of a backing and the luminance of a document. Furthermore, the methods of Feng are incapable of detecting the difference between the luminance of a backing and the luminance of a shadow cast by a document, because a shadow cast by a document, like the backing, would have a relatively uniform luminance, and the standard deviation of the shadow region would reflect only sensor noise. *In other words, the methods of Feng could not distinguish the transition between a backing and a shadow cast on the backing because the standard deviation of the luminance values recorded by respective sensor pixels imaging the backing and a shadow on the backing, would each only reflect sensor noise. Thus, the statistical measure used by Feng , i.e. a standard deviation, etc., would be of no utility in the scanner of Ichihara.*

The Examiner seeks to rebut this argument by merely asserting that Feng discloses a "variable luminance threshold value, automatically calculated." First, this assertion is non-responsive to the applicant's point, which is that Feng discloses no means of automatically calculating a variable threshold useful in detecting the boundary between a backing and a shadow on that backing. Moreover, Feng's "automatically calculated threshold" is not even used in Feng's boundary detection method. Although the Examiner cites column 6 lines 48-57 of Feng as disclosing the limitation of "a variable luminance threshold calculated using one or more statistical measures," the Examiner removed the context from this disclosure. The cited passages of Feng disclose using two statistical measures, e.g. peak white and black luminance values, to

calculate a threshold used "in determining whether a pixel is black or white, and whether the document covers the ends of the scanner." Neither of these instances remotely relate to detecting boundaries between a background cover and a document, let alone a background cover and a shadow of the document. The former instance (whether a pixel is black or white) cannot be used to detect a boundary because the binary black/white determination is too coarse a measure for that purpose, and in the latter instance, the boundary between the document and the cover is a moot issue because the boundary would not have scanned in the first instance, making detection of that boundary impossible. The Examiner proceeds on the presumption that the only obligation to support an obviousness rejection is to combine, piecemeal, two references that each disclose the certain respective phrases of the claim, irrespective of whether either of the references provides a teaching to one of ordinary skill in the art to combine the references *in the manner claimed.*

Accordingly, the combination of Ichihara and Feng does not suggest the limitation of "a variable luminance threshold value automatically calculated using one or more statistical measures and that causes detection of shadows cast by said object on said backing." Therefore, independent claim 40 patentably distinguishes over the cited combination, and the Examiner's rejection of this claim should be overturned.

Furthermore, the applicant notes that the Examiner's respective rejections of several dependent claims are groundless. For example, dependent claim 24 recites the limitation that the threshold value varies with the size of the image. The Examiner cites col. 6 lines 52-56 of Feng as reciting this limitation, but the cited passage merely states that a calculated threshold can be used to determine whether a document is larger than the width of the scanner. It does not disclose that the calculated threshold vary with the size of the document being scanned.

Similarly, Kowalski, U.S. Patent No. 5,778,104 does not suggest that either of Feng's or Ichihara's *thresholds* be "calculated based upon a percentage of the maximum observed statistical measure" as recited in claims 26 and 27. Instead, that reference merely discloses that a strength of a color smoothing *filter* may be based on the minimum and maximum luminance values in the neighborhood of a pixel to be filtered. This technique has absolutely no application in the respective boundary detection methods of Feng and Ichihara, which require no color information, and where neither threshold value is used to filter pixels of an imaged document. The Examiner posits that, "while Kowalski may apply the concepts cited in terms of a filter, the same concepts can be applied to document edge detection since document edge detection is a form of filtering." This logic is faulty. Merely because one statistical measure (a percentage of a maximum measured value) is appropriate for a threshold decision to apply one type of filter does not, per se, make that statistical measure appropriate for a threshold decision for all types of filters.

REJECTION UNDER 35 U.S.C. §103(a) IN VIEW OF THE RESPECTIVE COMBINATIONS OF ICHIHARA, FENG, AND YAMANISHI, AND ICHIHARA, FENG, AND KOWALSKI

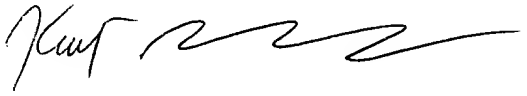
The Examiner's rejections of dependent claims 4-8, and dependent claims 9-11, 13, 22, 23, 26, and 27, respectively, are each premised on the erroneous contention that the combination of Ichihara with Feng discloses the limitation of "a variable luminance threshold value automatically calculated using one or more statistical measures and that causes detection of shadows cast by said object on said backing." Therefore, each of claims 4-8, 9-11, 13, 22, 23, 26, and 27, respectively, are patentably distinguishable over the respectively cited combinations

for the same reasons as is independent claim 40, and the Examiner's rejection of these claims should also be overturned.

CONCLUSION

The Examiner's respective rejections of claims 1-9 and 22-30 should be reversed, and the claims should be found patentable.

Respectfully submitted,



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CLAIMS APPENDIX

1 (canceled).

2. The imaging system of claim 40 wherein said object is a substantially flat document.

3. The imaging system of claim 2 wherein said backing is a cover and is substantially flat and is in face-to-face relationship with said object.

4. The imaging system of claim 3 wherein said cover has a background color that covers a major portion of said cover.

5. The imaging system of claim 4 wherein said imaging system is capable of determining a plurality of boundaries of said object.

6. The imaging system of claim 5 wherein said imaging system is capable of determining four boundaries of said object.

7. The imaging system of claim 5 wherein said imaging device has a flat surface supporting said object.

8. The imaging system of claim 7 wherein said object is paper.

9. The imaging system of claim 40 wherein said imaging system converts a first color space of an image obtained from sensing said object to a second color space where the luminance of said image is enhanced over the first color space for determining said at least one boundary of said object.

10. The imaging system of claim 9 wherein said first color space includes a plurality of dimensions and said second color space includes fewer dimensions than said first color space.

11. The imaging system of claim 10 wherein said first color space is red, green, and blue, and said second color space is luminance.

12. The imaging system of claim 40 wherein said imaging system increases the differences of luminance values in the range of likely document edge values.

13. The imaging system of claim 12 wherein said imaging system converts a first color space of an image obtained from sensing said object to a second color space where the luminance of said image is enhanced over the first color space when determining said at least one boundary of said object.

14. The imaging system of claim 40 wherein an image obtained from sensing said object has a plurality of horizontal rows of pixels vertically aligned with respect to each other, and said imaging system groups said horizontal rows of pixels into a plurality of vertically contiguous groups, and said imaging system computes a statistical measure in a direction

transverse to said horizontal row of pixels, using said statistical measure when detecting said boundary region.

15. The imaging system of claim 40 wherein an image obtained from sensing said object has a plurality of vertical columns of pixels horizontally aligned with each other, and said imaging system groups said vertical columns of pixels into a plurality of horizontally contiguous groups, and said imaging system computes a statistical measure in a direction transverse to said vertical column of pixels, using said statistical measure when determining said boundary region.

16 (canceled).

17. The imaging system of claim 14 where said imaging system detects edges using said statistical measure.

18. The imaging system of claim 15 where said imaging system detects edges using said statistical measure.

19 (canceled).

20. The imaging system of claim 17 wherein a set of statistical measures in a direction transverse to said horizontal row of pixels from a plurality of said groups are statistically processed for detecting a said boundary region.

21. The imaging system of claim 18 wherein a set of statistical measures in a direction transverse to said vertical column of pixels from a plurality of said groups are statistically processed for detecting a said boundary region.

22. The system of claim 20 wherein the statistical processing of said statistical measures emphasizes spatial regions of increased statistical measure.

23. The imaging system of claim 21 wherein the statistical processing of said statistical measures emphasizes spatial regions of increased statistical measure.

24. The imaging system of claim 20 wherein said threshold value varies with the size of the object being imaged.

25. The imaging system of claim 21 wherein said imaging system determines said at least one boundary of said object based upon a variable said threshold value calculated using said statistical measures.

26. The imaging system of claim 24 wherein said variable threshold value is calculated based upon a percentage of the maximum observed statistical measure.

27. The imaging system of claim 25 wherein said variable threshold value is calculated based upon a percentage of the maximum observed statistical measure.

28. The imaging system of claim 40 wherein an image obtained from sensing said object has a plurality of horizontal rows of pixels.

29 – 33 (canceled).

34. The imaging system of claim 40 wherein an image obtained from sensing said object has a plurality of vertical columns of pixels.

35 – 39 (canceled).

40. An imaging system for sensing an object, said imaging system comprising:

(a) an image sensor;

(b) a backing having a surface opposed to said sensor; and

(c) an image processor having a plurality of stat buffers and that analyzes candidate edges for bounding regions and identifies shadows cast by an object adjacent said backing as edges of a bounding region based, at least in part, on:

(i) a variable luminance threshold value automatically calculated using one or more statistical measures and that causes detection of shadows cast by said object on said backing; and

(ii) the presence of detected said shadows in a contiguous plurality of stat buffers.

EVIDENCE APPENDIX:

None.

RELATED PROCEEDINGS APPENDIX:

None.